REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 11-25 are pending in the present application. Claims 11, 15, and 19 are amended, Claims 1-10 are canceled without prejudice, and Claims 23-25 are added by the present amendment.

In the outstanding Office Action, Claims 1-4, 6-9, 11-13, and 15-17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Murthy et al. (U.S. Patent No. 6,235,568 B1, herein "Murthy") in view of Stevens et al. (U.S. Patent No. 5,170,242, herein "Stevens"); Claims 5, 10, 14, and 18 were rejected under 35 U.S.C. § 103(a) as unpatentable over Murthy in view of Stevens and Tanaka et al. (U.S. Patent No. 6,790,723 B2, herein "Tanaka"); Claims 19-21 were rejected under 35 U.S.C. §103(a) as unpatentable over Murthy in view of Stevens; and Claim 22 was rejected under 35 U.S.C. § 103(a) as unpatentable over Murthy, Stevens, and Tanaka.

Regarding the rejection of Claims 1-4, 6-9, 11-13, 15-17, and 19-21 under 35 U.S.C. § 103(a) as unpatentable over Murthy in view of Stevens, Claims 1-10 have been canceled and Claims 11, 15, and 19 have been amended to delete the language added in the previously filed amendment. In other words, Claims 11, 15, and 19 are amended to recite only the features of original Claims 11, 15, and 19. No new matter has been added.

Briefly recapitulating, independent Claim 11 is directed to a manufacturing method of a semiconductor device that includes, doping n-type impurity ions into a selected portion of a surface region of a p-type silicon semiconductor region; doping p-type impurity ions into the entire surface region of the silicon semiconductor region; activating the n-type and p-type impurity ions to form an n-type diffusion region in the surface region of the silicon semiconductor region and to form a p-type impurity diffusion layer in a depth direction of the

silicon semiconductor region; and performing heat treatment to form an Ni silicide film in the surface region of the n-type diffusion region after depositing Ni on the surface of the n-type diffusion region. The p-type impurity diffusion layer is formed after the formation of the Ni silicide film to have an impurity profile in which a peak concentration of not lower than 1E20 cm^{-3} is provided in a preset depth position of the Ni silicide film and a concentration in an interface between the Ni silicide film and the n-type diffusion region and a concentration in a position deeper than the interface are not higher than 5E19 cm^{-3}. Independent Claims 15 and 19 recite similar features as they have been amended similar to independent Claim 11.

Applicants note the methods of Claims 11, 15, and 19 recite that the Ni silicide film is formed after doping and activating the n-type and the p-type impurity ions. Thus, after the Ni silicide film is formed, heat treatment to activate the doped impurity ions is not performed thus preventing altering the resistance of the Ni silicide film.

Conventionally, a heat treatment to activate the doped impurity ions is performed at a high temperature, about 1000°C. If the Ni silicide film is exposed to such a high temperature, the Ni silicide film cannot maintain a low resistance. However, the Ni silicide film made as recited by Claims 11, 15, and 19 advantageously maintains the low resistance because no high temperature treatment is performed after forming the Ni silicide film.

The outstanding Office Action relies on Murthy for teaching a semiconductor device that includes various semiconductor regions asserted by the outstanding Office Action to correspond to the claimed p-type silicon semiconductor region, the n-type diffusion region, and the Ni silicide film. However, the outstanding Office Action recognizes at page 2, last paragraph, that "Murthy et al. do not disclose that a p-type impurity diffusion layer formed to extend from a surface of the Ni silicide film in a depth region." The outstanding Office Action relies on Stevens for disclosing the presence of the Ni silicide layer.

However, the outstanding Office Action does not address a feature of Claims 11, 15, and 19, i.e., the n-type impurity ions is activated to form an n-type diffusion region and then the heat treatment is applied to form the Ni silicide film on the surface region of the n-type diffusion region. It is noted that the n-type diffusion region on which the Ni silicide film is formed is as a result of activating the n-type impurity ions during the activating step.

Stevens shows in Figure 5 that active atomic species such as boron and nitrogen are implanted and annealed, and then, a second reactive barrier layer 220 is formed. However, a metal silicide layer 214 is formed on a doped silicon layer 212 before the boron and nitrogen are implanted and annealed as disclosed by Stevens at column 5, lines 38-46. Although Stevens does not explicitly state the temperature for annealing the implanted boron and nitrogen, one of ordinary skill in the art would recognize that the annealing is conventionally performed at a temperature of about 1000°C, as stated above.

Therefore, Applicants respectfully submit that the metal silicide layer 214 formed in Stevens before implanting boron and nitrogen is exposed to a high temperature of about 1000°C during the annealing procedure, which is contrary to the methods recited by Claims 11, 15, and 19. Thus, the metal silicide layer 214 of Stevens cannot maintain the low resistance.

Accordingly, Applicants respectfully submit that independent Claims 11, 15, and 19 and each of the claims depending therefrom patentably distinguish over Murthy and Stevens, either alone or in combination.

Regarding the rejections of the dependent claims under various combinations of Murthy, Stevens, and Tanaka, the disclosure of Tanaka has been considered but does not cure the deficiencies of Stevens and Murthy discussed above. In addition, Claims 14, 18, and 22 depend from independent Claims 11, 15, and 19, which are believed to be allowable as noted

above. Accordingly, it is respectfully submitted that dependent Claims 14, 18, and 22 are also allowable.

New Claims 23-25 are added to set forth the invention in a varying scope and Applicants submit the new claims are supported by the originally filed specification. In particular, new dependent Claims 23-25 depend from independent Claims 11, 15, and 19, which are believed to be allowable as noted above. Accordingly, it is respectfully submitted that new Claims 23-25 are allowable for similar reasons as discussed above.

Consequently, in light of above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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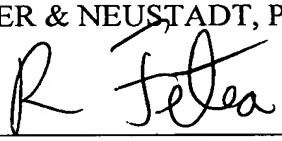

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